



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

*20/ Appeal
Brief
G. Stanley
7-8-03*

In Re Application of : Gengying Gao)

Serial No.: 09/670,154)

Examiner: Trung Q. Nguyen

Filed: 9/26/2000)

Art Unit: 2829

For: METHOD OF TESTING THE)
ELECTROSTATIC DISCHARGE)
PERFORMANCE OF AN IC DEVICE)

TC 2800 MAIL ROOM

JUN 18 2003

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APPEAL BRIEF
IN SUPPORT OF APPELLANTS' APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Hon. Commissioner of
Patents and Trademarks
Washington, DC 20231

Dear Sir:

The Appellants hereby submit this Brief in triplicate in support of their
appeal from a final decision by the Examiner, mailed March 26, 2003, in the
above case. The Appellants respectfully request consideration of this appeal by
the Board of Patent Appeals and Interferences for allowance of the above patent
application.

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Serial No. 09/670,154

APPEAL BRIEF

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I. REAL PARTY IN INTEREST

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II. RELATED APPEALS AND INTERFERENCES

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There are no related appeals or interferences

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III. STATUS OF THE CLAIMS

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Claims 1 to 20 are currently pending. No claims have been cancelled or added. Claims 1 to 20 stand rejected by the Examiner under the Final Rejection mailed December 18, 2002.

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Claims 1 to 20 stand rejected under 35 U.S.C. § 102 as being unpatentable over Paniccia et al (US 5,872,360) and are being appealed.

67

IV. STATUS OF AMENDMENTS

68 Amendments to claims 1 and 8 were filed after the final rejection and have not
69 been entered

70

V. SUMMARY OF INVENTION

71 The invention deals with a new method of testing the resilience of an integrated
72 circuit device to electrostatic discharge (ESD). In the past ESD resilience
73 involved a destructive approach involving discharging charge into the pins of
74 the IC device. In contrast, the present invention provides a way of determining
75 the ESD resilience in a non-destructive manner using a laser beam, and making a
76 determination based on the amount of light reflected by the diffusion region of
77 the IC compared to the amount of light absorbed by the diffusion region. This is
78 described in the first paragraph of the Summary of the Invention (page 1, lines
79 22-24), page 3, lines 13-17, and page 4 lines 23-31 read with Figure 3.

80 This has nothing to do with debugging a chip to determine whether it has
81 defects. In fact, the chip may very well work fine but simply have a low ability
82 to handle electrostatic discharges. It is a chip's ability to handle ESD that the
83 present invention addresses, and it manages to do this in a non-destructive
84 manner.

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VI. ISSUES

88 The issue is whether references dealing with the debugging of a chip or IC can
89 be used in rejecting claims directed to a method of detecting resilience of a chip
90 to ESD events.

91 Also, the question remains whether an explicit limitation in a claim dealing with
92 a comparison of the light reflection results from a tested chip with light reflection
93 results from a chip with known ESD resilience, can simply be ignored.

94

95 **VII. GROUPING OF CLAIMS**

96 Claims 1-20 were rejected based on the common argument that Paniccia et
97 al anticipated each of the claims. Claim 1 is the only independent claim, with
98 claims 2-20 depending from it.

99 **VIII. ARGUMENT**

100
101 Claim rejections - 35 USC 102

102 Claims 1-20 were rejected under 35 USC 102(b) over Paniccia.

103 It is respectfully submitted that Paniccia does not disclose testing ESD
104 performance.

105 Paniccia specifically discusses the problems of debugging a new product (col. 1,
106 lines 53-57). It then proposes a solution for determining voltage applied to a p-n
107 junction by monitoring the electric field by monitoring the electro-absorption of a
108 mode-locked laser (col. 7, lines 18-23).

109 Nowhere does Paniccia describe or suggest ways of monitoring ESD
110 performance of an IC device.

111 Claim 1, in contrast, specifically defines a method of monitoring ESD
112 performance. This is not a feature proposed in arguments or only in the
113 specification, but is specifically mentioned in claim 1.

114 However, in order to further distinguish the present invention from
115 Paniccia, claim 1 was amended to include the step of comparing the amount of
116 reflected light to the amount of reflected light from an I/O cell having good ESD
117 performance (see page 4, lines 23-31). This step is clearly not present in Paniccia
118 and is not suggested anywhere in Paniccia.

119 Since the remaining claims 2-20 depend from claim 1, they will include the
120 new limitation, and are therefore also distinguishable over Paniccia.

122 As to claim 8, it is respectfully submitted that Paniccia does not mention
123 averaging a number of measurements. Nevertheless, claim 8 was amended to
124 specify that the samples are taken at the same I/O signal voltage level. This
125 further distinguishes from Paniccia, which clearly discusses measurements at
126 different electric fields and temperatures (Fig. 7 and col. 7, lines 7-17).
127 As to claim 15, it is respectfully submitted that Paniccia does not discuss any
128 testing in pre-packaged form. The section referred to by the examiner (col. 5,
129 lines 50-55) has to be read in the context of the rest of the sentence which clearly
130 states that it is often necessary to do the testing while the chip is packaged. In
131 other words the section specifically sets the context of the problem, namely
132 testing a packaged device. This is used by Paniccia to justify the need for a laser.
133 Nowhere does it mention or contemplate testing of unfinished devices.
134 As to claim 16, it is respectfully submitted that Paniccia does not disclose that the
135 device includes only some of its layers. The section referred to by the examiner
136 (col. 1, lines 62-67) merely states that a typical IC has multiple layers and that it is
137 therefore difficult to access nodes buried deep in the chip. There is no mention of
138 testing while there are only some of the layers formed.

139

140 Response to specific arguments raised by examiner

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142 The examiner argued that ESD testing using a laser beam is known by those in
143 the art. This is entirely unsupported by any fact since there is no cited reference
144 to support this contention. In any event, claim 1 specifically includes the
145 limitation of comparing to an I/O cell having good ESD performance. This is not
146 disclosed or suggested in Paniccia or any other IC testing references.

147

148 The examiner argued that Paniccia discloses testing a device with only some of

149 its layers and that it disclosed using a continuous wave laser to probe the IC
150 device. As has been discussed above, Paniccia does not disclose a device having
151 only some of its layers (see arguments above).

152 Furthermore, it is respectfully submitted that Fig 7 and col. 8, lines 6-15 specify a
153 mode-locked laser, not a continuous wave laser. In any event, all of the
154 dependent claims depend from claim 1 and therefore include the limitations of
155 claim 1, and are therefore, by that reason alone, distinguishable over the prior
156 art.

157

158 In view of the amendment of claim 1 which specifically includes the limitation of
159 comparing the light reflected to the light reflected from an I/O cell with good
160 ESD performance, it is respectfully submitted that all of the claims are
161 distinguishable over the prior art.

162 Allowance of all of the claims is therefore respectfully requested.

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Charge Our Deposit Account

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If there are any further charges not accounted for herein, please charge

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them to our deposit account No. 140448

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Respectfully submitted,

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Vollrath & Associates

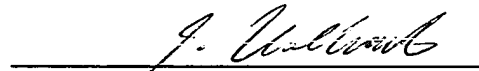
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Date: 6/12, 2003

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180 IX. APPENDIX
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- 182 1. A method of testing the ESD performance of an IC device, comprising
183 probing the device with a laser beam,
184 monitoring the amount of light reflected from the device, and
185 comparing the amount of light reflected to the amount of light
186 reflected from an I/O cell having good ESD performance.
- 187 2. A method of Claim 1, wherein the laser beam is used to probe the IC
188 device.
- 189 3. A method of Claim 2, wherein the energy of the laser beam
190 corresponds substantially to the bandgap of the substrate of the
191 device.
- 192 4. A method of Claim 3, wherein the substrate is silicon and the energy of
193 the laser beam is about 1.1eV.
- 194 5. A method of claim 3, wherein the diffusions of the IC device are
195 probed with the laser beam.
- 196 6. A method of Claim 5, wherein in the device is probed through the back
197 of the device.
- 198 7. A method of Claim 6, wherein the diffusions of I/O cells are probed to
199 determine how much light is absorbed and how much light is reflected
200 by the diffusions.
- 201 8. A method of Claim 5, wherein several samples are taken of each
202 probed location, at the same I/O signal voltage level, and the results
203 averaged.
- 204 9. A method of Claim 1, wherein a mode-locked laser is used to probe
205 the IC device.
- 206 10. A method of Claim 9, wherein a continuous wave laser is used in
207 addition to the mode-locked laser, to provide an image of the IC device
208 in order to facilitate the positioning of the beam of the mode-locked
209 laser.
- 210 11. A method of Claim 9, wherein the mode-locked laser is positioned by a
211 user.

- 212 12. A method of Claim 9, wherein the mode-locked laser is positioned
213 automatically using image recognition.
- 214 13. A method of Claim 5, wherein power is supplied to the device during
215 testing.
- 216 14. A method of Claim 13, wherein the testing is performed on the device
217 in a packaged form.
- 218 15. A method of Claim 13, wherein the testing is performed on the device
219 in a prepackaged form.
- 220 16. A method of Claim 15, wherein the device includes only some of its
221 layers.
- 222 17. A method of Claim 6, wherein a mode-locked laser is used to probe
223 the IC device.
- 224 18. A method of Claim 17, wherein a continuous wave laser is used in
225 addition to the mode-locked laser, to provide an image of the IC device
226 in order to facilitate the positioning of the beam of the mode-locked
227 laser.
- 228 19. A method of Claim 17, wherein the mode-locked laser is positioned by
229 a user.
- 230 20. A method of Claim 17, wherein the mode-locked laser is positioned
231 automatically using image recognition.
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